TDS 310
TDS 320
TDS 350

Acquire high speed transient or single-shot events to their full bandwidth and fastest sweep speed.

TDS 310
- 50 MHz Bandwidth
- 200 MS/s Sampling Rate

TDS 320
- 100 MHz Bandwidth
- 500 MS/s Sampling Rate

TDS 350
- 200 MHz Bandwidth
- 1 GS/s Sampling Rate

COMMON FEATURES
- Two Input Channels
- 2 mV/div to 10 V/div
- GPIB/RS-232 Programmability, Parallel Printer Interface and VGA Output with Opt. 14
- 8-Bit Vertical Resolution
- 1K Record Length
- Roll Mode
- Printer Pack Option
- Vector Accumulate and Dot Accumulate Display Modes
- 2% Vertical Accuracy
- 21 Automatic Measurements
- 10 ns Peak Detect Mode for High-Speed Glitch Capture
- Autosetup

Product(s) available through an Authorized Tektronix Distributor. See pages 590-595.

Digital Real Time Oscilloscopes
50 MHz, 100 MHz, and 200 MHz

TDS 320

TDS 300 Series

The TDS 300 Series redefines the low-cost digital oscilloscope. By sampling the signal at up to five times the analog bandwidth on both channels simultaneously, you can be assured of true acquisitions, minimizing aliasing or other digital sampling effects. Unlike other DSOs, the TDS 300 Series easily gathers enough samples to display waveforms accurately to their full bandwidth. They are the only scopes in their class that can reliably acquire high-speed transient or single-shot events to their fastest sweep speed.

Many low-cost DSOs offer only dot displays, which can be hard to interpret by those used to analog scopes. The TDS 300 Series has Dot, Dot Accumulate, Vector, and Vector Accumulate display modes – another advantage over the competition.

The Accumulate modes gather multiple waveforms for a user-defined time (500 ms to ∞), after which the screen is cleared. Vector Accumulate mode uses bright vectors to superimpose the current acquisition over the accumulated waveforms. Dot accumulate mode is recommended for viewing video and other complex waveforms. The display is erased at the time set or when the acquisition setting is changed. These modes are useful for doing worst-case analysis or signal monitoring. Long-term monitoring may be done easily by setting the erase time to infinity.
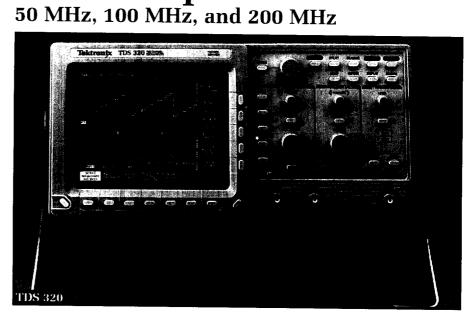
OVERSAMPLING MINIMIZES ALIASING
When aliasing occurs, the scope displays a waveform record with a lower frequency than the actual input signal. Aliasing occurs because the oscilloscope cannot acquire the signal fast enough to construct an accurate waveform record. To acquire a signal, it must be sampled at least twice as fast as the highest frequency component. For example, with a 500 MS/s sampling rate, the TDS 320 gathers two and a half times the number of samples needed to acquire a 100 MHz signal in real time, assuring users of accuracy up to the fastest sweep speed. This degree of oversampling not only minimizes aliasing, it provides a higher resolution waveform.

ACQUISITION POWER
With edge triggering and basic video triggering as standard features, the TDS 300 Series can capture the waveforms that designers and service technicians most need to see. In addition to 21 automatic waveform measurements, the TDS 300 Series offers four acquisition modes: Sample, Peak Detect, Envelope, and Average. Sample mode provides real-time sampling and has the highest throughput rate. Peak Detect locates glitches as small as 10 ns and reveals aliasing. Envelope mode, by including the highest and lowest points over many acquisitions, shows variations in the signal over time. Average mode uses several acquisitions to calculate an average value for each waveform point, reducing random noise in repetitive signals.

A P P L I C A T I O N S

- Service
- Education
- Design

Digital Real Time Oscilloscopes

50 MHz, 100 MHz, and 200 MHz

ANALOG SIMPLICITY, DIGITAL PRODUCTIVITY

By balancing the use of on-screen menus with dedicated buttons and knobs, the user-friendly interface retains traditional analog simplicity yet gives quick access to the wide range of digital functions. Frequently used functions, like position and trigger level, are controlled directly with knobs; secondary functions are menu driven, eliminating the profusion of buttons found on most low-cost scopes.

This modern interface dramatically flattens the learning curve, appealing to users regardless of their digital experience. The TDS 300 Series interface simplifies scope operation without limiting the instrument's capabilities.

COMMUNICATION OPTION

The I/O Interface (Option 14) includes GPIB, RS-232 I/O interface and a Centronics-type parallel printer port. With this option you can use a remote computer to control the scope for automated testing, or to exchange waveform or measurement data for documentation and analysis. In addition, a VGA monitor output is provided for classroom viewing or other applications requiring a monitor.

Interleaf (.img), TIFF, PCX, BMP, and EPS file formats allow screen captures to be placed directly into desktop publishing documents. Or, at the push of a button, a screen shot can be output directly to a variety of compatible printers.

The Printer Pack, Option 3P, provides a single-handle solution to the portable printer problem. A quiet thermal printer, mounted in a pouch attached to the scope, makes clear four-inch hardcopies while you continue working. Option 14 is included in Option 3P.

For service, education, and design work, the TDS 300 Series is without peer among low-cost DSOs.

Characteristics

SIGNAL ACQUISITION SYSTEM

Bandwidth – 50 MHz (TDS 310), 100 MHz (TDS 320), 200 MHz (TDS 350).

Sample Rate – 200 MS/s on each channel (TDS 310), 500 MS/s on each channel (TDS 320), 1 GS/s on each channel (TDS 350).

Channels – Two identical channels, each with invert function.

Sensitivity – 2 mV to 10 V/div (with calibrated fine adjust).

Position Range – ±5 divisions.

Calibrated Offset Ranges –

V/div setting	Offset Range
2 mV – 99.5 mV/div	±1 V
100 mV – 995 mV/div	±10 V
1 V/div – 10 V/div	±100 V

DC Gain Accuracy – ±2%.

Vertical Resolution – 8-bits (256 levels over 10.24 vertical divisions).

ACQUISITION MODES

Sample, Envelope, Average, Peak Detect – High frequency and random glitch capture. Captures glitches as narrow as 10 ns using acquisition hardware at all time/div settings between 25 μs/div and 2.5 s/div (inclusive).

TIME BASE SYSTEM (MAIN AND DELAYED)

Time/Division Range – 10 ns to 5 s/div (TDS 310), 5 ns to 5 s/div (TDS 320), 2.5 ns – 5 s/div (TDS 350).

Record Length – 1000 sample points per channel.

Time Base Accuracy – ±0.01%.

TRIGGERING SYSTEM (MAIN ONLY)

Trigger Types – Edge, Video.

Trigger Modes – Auto, Normal.

Video Trigger Types – Triggers on Field 1, Field 2, or Lines; from sync-negative composite video, 525 to 625 lines, 50 MHz to 60 Hz, interlaced or noninterlaced systems, such as NTSC and PAL.

DISPLAY

Vector – Connects sample points to display a continuous waveform.

Dots – Displays sample dots only.

Vector Accumulate Mode – Accumulates waveform points over a pre-set period of time (500 ms to ∞) and superimposes the current waveform with bright vectors.

Dot Accumulate Mode – Accumulates waveform points over a pre-set period of time (500 ms to ∞).

Format – YT and XY.

AUTOMATIC MEASUREMENTS

Period, Frequency, + Width, – Width, Rise Time, Fall Time, + Duty Cycle, – Duty Cycle, + Overshoot, – Overshoot, High, Low, Max, Min, Pk-Pk, Amplitude, Mean, Cycle Mean, RMS, Cycle RMS, Burst Width.

Cursors – Horizontal bars, vertical bars, paired (volts @ time).

Readouts – Absolute volts, Δ volts, time, and frequency.

WAVEFORM PROCESSING

Arithmetic Operators – Add, Subtract., Multiply.

Autosetup – Single button automatic setup on selected input signal for vertical, horizontal, and trigger systems.

OPT. 14 (I/O INTERFACE): COMPUTER INTERFACE AND HARDCOPY CAPABILITY

GPIB (IEEE-488.2) Programmability – Full talk/listen modes. Control of all modes, settings, and measurements.

RS-232 Interface Programmability – Full talk/listen modes. Control of all modes, settings, and measurements. Baud Rate up to 19,200. 9-Pin, DTE.

Video Output – Standard analog VGA output to external monitors.

Hardcopy Port – Centronics-type parallel or RS-232.

Graphics Interface File Formats – Interleaf (.img), TIFF, PCX (PC Paintbrush), BMP (Microsoft Windows), and Encapsulated Postscript (EPS).

Printer Formats – ThinkJet, DeskJet, LaserJet, Epson (9 & 24-Pin), Seiko DPU 411/II, DPU 412. DC power provided for Seiko printers.

WAVEFORM STORAGE

Waveforms – Two 1000 point reference waveforms.

Setups – 10 front-panel setups.

POWER REQUIREMENTS

Maximum Power Consumption – 65 watts.

MECHANICAL

Cooling Method – Forced air circulation with no air filter.

ENVIRONMENTAL AND SAFETY

Temperature –
–10°C to +55°C (operating);
–51°C to +71°C (nonoperating).

Humidity – Up to 95% RH at or below +40°C; up to 75% RH from 41°C to 55°C (operating and nonoperating).

Altitude – To 15,000 ft./4570 m (operating); To 40,000 ft./12,190 m (nonoperating).

Electromagnetic Compatibility – Meets EN50081-1; VFG 0243; FCC Rules and Regs, 47 CFR, Part 15, Subpart B, Class A.

Safety – UL 1244 Listed, Category Certified CAN/CSA C-22.2 no. 231 Series M89.

Digital Real Time Oscilloscopes
50 MHz, 100 MHz, and 200 MHz

PHYSICAL CHARACTERISTICS

Dimensions	TDS 310/TDS 320/TDS 350		Rackmount	
	mm	in.	mm	in.
Width with handle	362	14.25	483	19
Height with feet, pouch	191	7.5	–	–
without pouch	165	6.5	178	7
Depth (stand alone)	471	18.6	472	18.6
with front cover	490	19.3	–	–
with handle(s)	564	22.2	517	20.4
Weight	**kg**	**lb.**	**kg**	**lb.**
Stand alone	6.8	15	–	–
Net with accessories, cover and pouch	8.4	18.5	4.5*1	10*1
Domestic Shipping	12.7	28	14.5	32

*1 Weight of conversion kit only.

Accessory

DocuWave™ SOFTWARE (S60DWAV)
• Easy to use – learn in less than 30 minutes.

• Sends, receives, saves waveforms/settings for Tektronix DSOs and Digitizers with GPIB or serial interfaces.

• Sends formatted waveforms to: printer, spreadsheet, desktop publishing software.

See pages 73-75 for complete information on DocuWave™.

For complete selection information on all Accessory products, see page 446.

ORDERING INFORMATION
Contact your Tektronix representative for price and ordering information.

TDS 310 – 50 MHz Oscilloscope
TDS 320 – 100 MHz Oscilloscope
TDS 350 – 200 MHz Oscilloscope
Includes: Two P6109B 10X Probes (P6111B – TDS 350), Instruction Manual, Reference Guide, US Power Cord, XYZs of Analog and Digital Oscilloscopes

INSTRUMENT OPTIONS
Opt. 14 – I/O Interface (includes GPIB, RS-232 interfaces, VGA output and Centronics-type parallel port, plus Programmer Manual)
Opt. 3P – 120 V Printer Pack: includes Opt. 14, Thermal Printer, 5 rolls paper (006-7580-00), Pouch, Printer Cable

SERVICE ASSURANCE OPTIONS
These products covered by the following service assurance option
REP4300 – Provides One Year of Post-Warranty Repair Protection
CAL4300 – Provides One Year of Calibration Services

AVAILABLE ACCESSORIES
TD3F14A – Opt. 14 Field Upgrade Kit
TDS4F5P – 120 V Printer Pack Field Upgrade Kit (includes Pouch, requires Opt. 14)
TDS4F6P – 220 V Printer Pack Field Upgrade Kit (includes Pouch, requires Opt. 14) Digital Real Time Oscilloscope

INTERNATIONAL POWER PLUG OPTIONS
Opt. A1 – Universal Euro 220 V, 50 Hz
Opt. A2 – United Kingdom 240 V, 50 Hz
Opt. A3 – Australia 240 V, 50 Hz
Opt. A4 – North America 240 V, 60 Hz
Opt. A5 – Switzerland 220 V, 50 Hz

SOFTWARE
DocuWave™ – See page 73. Order S60DWAV
RECOMMENDED ACCESSORIES
See pages 446 for complete selection information.
PROBES
High Voltage – Order P5100
1X Passive. Order P6101B
1X-10X Switchable Passive. Order P6129B
TTL Logic – Order P6408
SMD – Order P6561AS
DC/AC Current Probe System – Order AM503S
CAMERAS/PRINTERS
Camera – C-9, Option 04, includes 016-1154-00 Hood.
Bubble Jet Printer – Order HC220
Thermal Printer Pack – Order TDS4F5P
CART
Order K212
ADDITIONAL ACCESSORIES
Soft-sided Carrying Case – Order 016-1158-00
Transit Case – Order 016-0792-01
Deluxe Transit Case with Retractable Wheels/Handle – Order 016-1157-00
Front Cover – Order 200-3232-01
Accessories Pouch – Order 016-1159-00
Rackmount Kit – Order 016-1166-00
Cables, RS-232 –
To connect to a computer with a 9-Pin RS-232 connector, 2M, null modem. Order 012-1379-00
To connect to a computer with a 25-Pin RS-232 connector, 1M, null modem. Order 012-1380-00
To connect to a RS-232 printer or plotter, 9ft., 25-Pin, straight through. Order 012-1398-00

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ISO 9001
ACCREDITED BY THE DUTCH COUNCIL FOR CERTIFICATION
Tektronix Measurement products are manufactured in ISO registered facilities.